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New data to the earthworm fauna of Israel (Oligochaeta, Lumbricidae)

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Abstract. Elaborating several smaller earthworm samples collected in different parts of Israel resulted in recording 20 earthworm species including *Bimastos parvus* (Eisen, 1874) a North American peregrine which represents new record for the country. Three other species; *Dendrobaena nevoi* Csuzdi & Pavlíček, 1999, *Healyella jordanis* (Csuzdi & Pavlíček, 1999) and *Perelia shamsi* Csuzdi & Pavlíček, 2005 were first recorded after their original descriptions. The present list of lumbricid earthworms recorded for Israel is raised to 28.

Keywords. Earthworms, faunistics, new record, Middle East, Israel

INTRODUCTION

The earthworm fauna of Israel is quite well-known. From the turn of the last century till 1990th, more than ten papers dealt with the fauna of the region (Rosa 1893, Michaelsen 1901, 1910, 1926, Stephenson 1913, 1922, Bodenheimer 1935, 1937, Černosvitov 1938, 1940, 1942, Omodeo 1956, Zicsi 1985). From the mid- 1990's an intensive research on earthworms of Israel has been launched. As a result, Csuzdi *et al*. (1998) described a new species to science and then Csuzdi & Pavlíček (1999) recorded the presence of 10 *Dendrobaena* and two *Healyella* species from the country including four species new to science. Since then, the occurrence of *Murchieona minuscula* (Rosa, 1905) was reported as new record for the fauna (Csuzdi & Pavlíček 2002) and two new *Perelia* species were described from Israel (Csuzdi & Pavlíček 2005). With all these data, the list of the lumbricid earthworms in Israel consisted of 27 species.

In this paper we present the unpublished results of the earthworm collecting trips to Israel in the 2000s including formal recording of *Bimastos parvus* (Eisen, 1874) for the first time.

MATERIALS AND METHODS

Earthworms were collected by the diluted formaldehyde method (Raw 1959), complemented with digging and hand-sorting. A combination of these methods provides more efficient sampling of earthworms. The specimens collected were killed in 75% ethanol, fixed in 4% formalin, then transferred into 75% ethanol and deposited in the earthworm collection of the Hungarian Natural History Museum (HNHM). Part of the material was fixed and placed into 96% ethanol for further DNA studies.

RESULTS

Aporrectodea caliginosa (Savigny, 1826)

Enterion caliginosum Savigny, 1826: 80.
Allolobophora (Allolobophora) caliginosa: Rosa 1893: 7.
Allolobophora caliginosa: Bodenheimer 1935: 393.
Helodrilus caliginosus: Bodenheimer 1937: 259.

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Allolobophora caliginosa var. *trapezoides*: Černosvitov 1940: 446.
Allolobophora caliginosa f. *trapezoides*: Omodeo 1956: 335.
Aporrectodea caliginosa caliginosa: Pavlíček *et al.* 2003: 456.
Aporrectodea caliginosa trapezoides: Zicsi 1985: 330., Pavlíček *et al.* 2003: 456.
Aporrectodea caliginosa: Csuzdi & Pavlíček 2005: 88.

Material examined. HNHM/15117 1 ex., Dalton – Ein Zeitim, chalk, 33°00'41"N 35°28'52"E, 06.02.2006., leg. T. Pavlíček; HNHM/15121 2 ex., Wadi Al-Kelt, 28.01.2006., leg. T. Pavlíček; HNHM/15139 2 ex., Tel Gezer, 31°51'N 34° 54'E, 04.01.2003., leg. T. Pavlíček; HNHM/ 15144 2 ex., Tel Keshet, temporary stream, 31°32'17"N 34°45'51"E, 31.01.2003., leg. T. Pavlíček; HNHM/15155 2 ex., 1 km N of Beer Sheva, 08.01.2003., leg. T. Pavlíček; HNHM/ 15159 2 ex., Ein Zeitim, 13.02.2005., leg. T. Pavlíček; HNHM/15192 3 ex., Al-Kelt, 30.03. 2005., leg. T. Pavlíček; HNHM/16354 1 ex., Wadi Kelt, near of the spring, 31°50'30"N 35°21'39"E, leg. T. Pavlíček, P. Cardet; HNHM/ 16702 1 ex., Golan Heights, 714 m, 32°59'N 35°48'E, 26.03.2009., leg. T. Pavlíček.

Remarks. The Israeli population of *Ap. caliginosa* is dominated by the *trapezoides* form. Among the collected specimens only two (No. 15159) showed transitional characteristics and were more similar to the classical *caliginosa* form.

Aporrectodea jassyensis (Michaelsen, 1891)

Allolobophora jassyensis Michaelsen, 1891: 15.
Allolobophora (Allolobophora) jassyensis: Rosa 1893: 8.
Helodrilus jassyensis orientalis: Bodenheimer 1935: 393., 1937: 259.
Allolobophora jassyensis f. *orientalis*: Omodeo 1956: 333.
Aporrectodea jassyensis: Pavlíček *et al.* 2003: 456., Csuzdi & Pavlíček 2005: 89.

Material examined. HNHM/14986 1 ex., Keren Ben Zimra – Alma, 25.01.2006., leg. T. Pavlíček; HNHM/15112 1 ex., Keren Ben Zimra – Alma, 01.02.2006., leg. T. Pavlíček; HNHM/ 15191 1 ex., Al-Kelt, 30.03.2005., leg. T. Pavlíček; HNHM/15216 1 ex., Nahal Tabor, 32°42' 49"N 34°58'22"E, 28.04.2004., leg. T. Pavlíček; HNHM/15237 4 ex., Keren Ben Zimra, 08.02. 2007., leg. T. Pavlíček; HNHM/15660 1 ex., Kerem Ben Zimra – Alma, chalk soil, 17.03.2007., leg. T. Pavlíček, HNHM/15661 2 ex., Kerem Ben Zimra – Alma, basalt soil, 17.03.2007., leg. T. Pavlíček; HNHM/15663 2 x., Tabgha, chalk, grassy area, 20.02.2007., leg. T. Pavlíček.

Aporrectodea rosea (Savigny, 1826)

Enterion roseum Savigny, 1826: 182.
Allolobophora (Notogama) rosea: Rosa 1893: 2.
Eisenia rosea: Bodenheimer 1935: 393., 1937: 259.
Eisenia rosea? var.: Černosvitov 1940: 441.
Allolobophora rosea: Omodeo 1956: 334., Zicsi 1985: 331.
Aporrectodea rosea: Pavlíček *et al.* 2003: 456., Csuzdi & Pavlíček 2005: 89.

Material examined. HNHM/15118 1 ex., Dalton – Ein Zeitim, chalk, 33°00'41"N 35°28'52"E, 06.02.2006., leg. T. Pavlíček; HNHM/15138 1 ex., Tel Gezer, 31°51'N 34°54'E, 04.01.2003., leg. T. Pavlíček; HNHM/15145 2 ex., Tel Keshet, temporary stream, 31°32'17"N 34°45'51"E, 31. 01.2003., leg. T. Pavlíček; HNHM/15149 1 ex., North Negev, W of Beer Sheva, 31°29'11"N 34°47'50"E, 31.01.2003., leg. T. Pavlíček; HNHM/15158 3 ex., Ein Zeitim, 13.02.2005., leg. T. Pavlíček; HNHM/15162 1 ex., HNHM/15165 1 ex., Golan Heights, Afiq, 28.02.2005., leg. T. Pavlíček; HNHM/15193 2 ex., Al-Kelt, 30.03. 2005., leg. T. Pavlíček; HNHM/15204 7 ex., Golan Heights, Mas'ade, forest, 33°12'N 35° 45'E, 26.04.2004., leg. T. Pavlíček.

Bimastos parvus (Eisen, 1874)

Allolobophora parva Eisen, 1874: 46.
?*Bimastos parvus*: Pavlíček *et al.* 2003: 455.

Material examined. HNHM/14301 2 ex., Mount Carmel, Ein Kedem, 10.11.2001., leg. T. Pavlíček; HNHM/15170 1 ex., Kibutz Yagur, garden centre, 11.08.2005., leg. T. Pavlíček;

HNHM/15171 1 ex., Mount Carmel, Isfiya, garden centre, under flower pots, 23.07.2005., leg. T. Pavlíček; HNHM/16357 1 ex., Wadi Kelt, near of the spring, 31°50'30"N 35°21'39"E, leg. T. Pavlíček, P. Cardet.

Remarks. Pavlíček *et al.* (2003) already noted the possible presence of *Bimastos parvus* in Israel, but without exact locality and uncertain species identification. The new material is well preserved and reliably identified therefore this is the first, officially recorded occurrence of *B. parvus* from Israel. *B. parvus* is of North American origin and perhaps currently spreading via gardening centra.

***Dendrobaena byblica byblica* (Rosa, 1893)**

Allolobophora (Dendrobaena) byblica: Rosa, 1893: 4–5.
Helodrilus (Dendrobaena) lacustris: Stephenson 1913: 55.
Dendrobaena fedschenkoi: Michaelsen 1926: 352.
Helodrilus ganglbaueri byblicus: Bodenheimer 1937: 259.
Helodrilus lacustris: Bodenheimer 1937: 259.
Dendrobaena byblica var. *ganglbaueri*: Černosvitov 1940: 446., 1942: 225.
Dendrobaena byblica: Zicsi 1985: 328., Csuzdi & Pavlíček 1999: 474., 2002: 110., Pavlíček *et al.* 2003: 456.

Material examined. HNHM/14412 2 ex., Golan Heights, Nahal Neshef, 33°12'09"N 35°38'46"E, 16.02.2002., leg. T. Pavlíček; HNHM/14709 1 ex., Zarka, Main Jordan, 16.01. 2004., leg. T. Pavlíček; HNHM/14711 8 ex., Nahal Parash, W slope of Golan, 25.05.2002., leg. T. Pavlíček; HNHM/15190 4 ex., Al-Kelt, 30.03. 2005., leg. T. Pavlíček; HNHM/15198 7 ex., Golan Heights, upper part of Nahal Yehudia, 32° 50'03"N 35°48'03"E, 23.06.2002., leg. T. Pavlíček; HNHM/15669 1 ex., Wadi Kelt, 30.04. 2009, leg. T. Pavlíček; HNHM/16353 7 ex., Har Arbel, 12.05.2003., leg. T. Pavlíček; HNHM/ 16355 1 ex., Wadi Kelt, near of the spring, 31°50'30"N 35°21'39"E, leg. T. Pavlíček, P. Cardet; HNHM/ 16364 1 ex., Golan Heights, Nahal Samakh, near of water, 28.02.2005., leg. T. Pavlíček.

***Dendrobaena hauseri* Zicsi, 1973**

Dendrobaena hauseri Zicsi, 1973: 222., Csuzdi & Pavlíček 1999: 474., Pavlíček *et al.* 2003: 456.
Bimastos hauseri: Zicsi 1985: 329.

Material examined. HNHM/14717 2 ex., Rehaniya, limestone, 29.03.2002., leg. T. Pavlíček; HNHM/14719 1 ex., Mi'ilya, 29.03.2004., leg. T. Pavlíček; HNHM/14721 2 ex., Mi'ilya, 25.03.2004., leg. T. Pavlíček; HNHM/15107 2 ex., Ein Zeitim, basaltic rock, 33°00'N 35°28'E, 12.01.2005., leg. T. Pavlíček; HNHM/15110 2 ex., Ein Zeitim, 13.02.2005., leg. T. Pavlíček; HNHM/15219 1 ex., Nahal Tabor, 32°42'24"N 35°33'16"E, 28.02.2004., leg. T. Pavlíček.

***Dendrobaena kervillei* (Michaelsen, 1910)**

Helodrilus (Eisenia) venetus var. *kervillei* Michaelsen, 1910: 166–167.
Eisenia veneta var. *kervillei*: Michaelsen 1926: 352.
Allolobophora (Notogama) alpina: Rosa 1893: 3.
Dendrobaena veneta kervillei: Zicsi 1985: 329., Csuzdi & Pavlíček 1999: 479.
Dendrobaena kervillei: Csuzdi & Pavlíček 2002: 110., Pavlíček *et al.* 2003: 456.

Material examined. HNHM/16699 1 ex., Mount Hermon, 1630 m, 33°19'N 35°46'E, 19. 03.2009., leg. T. Pavlíček.

***Dendrobaena negevis* Csuzdi & Pavlíček, 1999**

Dendrobaena negevis Csuzdi & Pavlíček, 1999: 482., 2002: 112., Pavlíček *et al.* 2003: 456.

Material examined. HNHM/15120 5 ex., Wadi Al-Kelt, 28.01.2006., leg. T. Pavlíček; HNHM/ 15142 13 ex., Mount Gilboa, 32°25'07"N 35°26' 08"E, 11.02.2006., leg. T. Pavlíček; HNHM/ 15143 4 ex., Tel Keshet (S of Qiryat Gat), 08.01.2003., leg. T. Pavlíček; HNHM/15147 2 ex., North Negev, W of Beer Sheva, 31°29'11"N 34°47'50"E, 31.01.2003., leg. T. Pavlíček; HNHM/15150 2 ex., Tel Keshet, 31°32'N 34°45'E, 31.01.2003., leg. T. Pavlíček; HNHM/ 15153 1 ex., North Negev, 27 km N of Beer

Sheva, 31°28'34"N 34°47'55"E, 31.01.2003., leg. T. Pavlíček; HNHM/15195 10 ex., Tel Gezer, 31°51'N 34°54'E, 04.01.2003., leg. T. Pavlíček.

Dendrobaena nevoi Csuzdi & Pavlíček, 1999

Dendrobaena nevoi Csuzdi & Pavlíček, 1999: 480., Pavlíček *et al.* 2003: 456.

Material examined. HNHM/14722 2 ex., Allone Abba, 32°44'08"N 35°20'30"E, 27.03. 2004., leg. T. Pavlíček.

Dendrobaena orientalis Černosvitov, 1940

Dendrobaena orientalis Černosvitov, 1940: 444., Zicsi 1985: 327., Csuzdi & Pavlíček 1999: 475., 2002: 110., Pavlíček *et al.* 2003: 456.
Dendrobaena semitica: Omodeo 1956: 331.

Material examined. HNHM/14398 1 ex., Mount Meron, under oak, 33°00'33"N 35° 23'42"E, 06.02.2002., leg. T. Pavlíček; HNHM/ 14407 1 ex., Mount Carmel, Nahal Ezov, 09. 02.2002., leg. T. Pavlíček; HNHM/14410 1 ex., Mount Carmel, Nahal Ezov, Maqui slope, 09.02.2002., leg. T. Pavlíček; HNHM/14416 2 ex., Golan Heights, Rabana, 33°00'35"N 35° 23'42"E, 15.02.2002., leg. T. Pavlíček; HNHM/ 14419 8 ex., HNHM/14424 7 ex., Golan Heights, Rabana, sinkhole, 33°12'04"N 35°44'01"E, 15.02.2002., leg. T. Pavlíček; HNHM/14700 1 ex., Nahal Oren, 04.03.2002., leg. T. Pavlíček; HNHM/15108 1 ex., HNHM/15187 1 ex., Ein Zeitim, basalt, 33°00'34"N 35°28'50"E, 12.01. 2005., leg. T. Pavlíček; HNHM/15156 2 ex., Ein Zeitim, 16.02.2005., leg. T. Pavlíček; HNHM/ 15164 3 ex., Rehaniya, basalt, 10.02.2005., leg. T. Pavlíček; HNHM/15167 1 ex., Nahal Keziv, 29.04.2005., leg. T. Pavlíček; HNHM/15209 7 ex., Mi'ilya, 28.02.2005., leg. T. Pavlíček; HNHM/15220 3 ex., Nahal Tabor, 32°42'24"N 35°33'16"E, 28.02.2004., leg. T. Pavlíček; HNHM/15321 1 ex., Golan Heights, Afiq, 14.03. 2005., leg. T. Pavlíček; HNHM/15681 1 ex., Dalton, 11.01.2009., leg. T. Pavlíček; HNHM/ 16267 2 ex., Rehaniya, chalk, 12.01.2005., leg. T. Pavlíček; HNHM/16271 3 ex., Nahal Oren, 27. 03.2006., leg. T. Pavlíček; HNHM/16494 1 ex., Rehaniya, basalt soil, 12.01.2005., leg. T. Pavlíček; HNHM/16700 10 ex., Mount Hermon, 1630m, 33°19'N 35°46'E, 19.03.2009., leg. T. Pavlíček.

Dendrobaena samarigera (Rosa, 1893)

Allolobophora (Dendrobaena) samarigera Rosa, 1893: 5.
Helodrilus (Dendrobaena) samariger: Michaelsen 1901: 213., Stephenson 1922: 136.
Helodrilus samarigera: Bodenheimer, 1935: 391.
Helodrilus samariger: Bodenheimer, 1937: 259.
Dendrobaena samarigera: Omodeo 1956: 331., Csuzdi & Pavlíček 1999: 476., Pavlíček *et al.* 2003: 456.

Material examined. HNHM/14919 2 ex., Barta'ah, oak macqui, 32°28'46"N 35°08'00"E, 25.02.2006., leg. T. Pavlíček; HNHM/15212 2 ex., Lower Galilee, near of Kaukab Abu el Hija, 32°45'56"N 35°14'16"E, 18.04.2004., leg. T. Pavlíček; HNHM/15217 1 ex., Mount Tabor, 21.02.2004., leg. T. Pavlíček; HNHM/15635 2 ex., Mount Carmel, 18.02.2006., leg. T. Pavlíček; HNHM/16269 1 ex., Rehaniya, chalk, 12.01. 2005., leg. T. Pavlíček.

Dendrobaena semitica (Rosa, 1893)

Allolobophora (Dendrobaena) semitica Rosa, 1893: 3.
Dendrobaena semitica var. *kervillei*: Michaelsen 1910: 167., 1926: 353.
Helodrilus semiticus: Bodenheimer 1937: 259.
Dendrobaena semitica: Zicsi 1985: 324., Csuzdi & Pavlíček 1999: 477., 2002: 110., Pavlíček *et al.* 2003: 456.

Material examined. HNHM/14397 3 ex., E bank of Kineret, 32°50'10"N 35°38'52"E, 05.02.2002., leg. T. Pavlíček; HNHM/14400 1 ex., E bank of Kimeret, 32°50'N 35°39'E, 05.02.2002., leg. T. Pavlíček; HNHM/14404 12 ex., Mount Carmel, near of Ornit Cave, 32° 45'34"N 34°59'50"E, 02.02.2002., leg. T. Pavlíček; HNHM/14437 1 ex., Mount Carmel, Ein Kedem, 25.01.2002., leg. T. Pavlíček; HNHM/ 14442 4 ex., Nahal Keziv, under oak, 18.02.2002., leg. T. Pavlíček; HNHM/14712 5 ex., Nahal

Tabor, Jordan Valley, E side of road No. 90, 32°54'56"N 35°07'30"E, 21.02.2004., leg. T. Pavlíček; HNHM/14818 1 ex., Basmat Tab'un, 27.04.2004., leg. T. Pavlíček; HNHM/14874 1 ex., Lower Galilee, Hannaton, park forest, 32° 49'25"N 35°46'21"E, 2003., leg. T. Pavlíček; HNHM/15168 6 ex., Nahal Keziv, 29.04.2005., leg. T. Pavlíček; HNHM/15213 2 ex., Lower Galilee, near of Kaukab Abu el Hija, 32°45'56"N 35°14'16"E, 18.04.2004., leg. T. Pavlíček; HNHM/15218 4 ex., Mount Tabor, 21.02.2004., leg. T. Pavlíček; HNHM/15221 9 ex., Nahal Tabor, 32°42'24"N 35°33'16"E, 28.02.2004., leg. T. Pavlíček; HNHM/15636 1 ex., Mount Carmel, 18.02.2006., leg. T. Pavlíček; HNHM/15641 3 ex., Mount Carmel, near of a brook, 18.02.2006., leg. T. Pavlíček; HNHM/15679 1 ex., Mi'ilya, 28.02.2005., leg. T. Pavlíček; HNHM/15680 1 ex., Dalton, 11.01.2009., leg. T. Pavlíček; HN HM/16268 1 ex., Rehaniya, chalk, 12.01.2005., leg. T. Pavlíček.

Dendrobaena veneta veneta (Rosa, 1886)

Allolobophora veneta Rosa, 1886: 1.
Allolobophora (Notogama) veneta: Rosa 1893: 2.
Dendrobaena veneta: Zicsi 1985: 328., Csuzdi & Pavlíček 2002: 111.
Dendrobaena veneta veneta: Csuzdi & Pavlíček 1999: 478., Pavlíček *et al.* 2003: 456.

Material examined. HNHM/14393 2 ex., Nahal Kezif, near of E bank of Kineret, 32°51'47"N 35°37'04"E, 05.02.2002., leg. T. Pavlíček; HNHM/14394 2 ex., Nahal Keziv, 32°49'52"N 35°39'03"E, 06.02.2002., leg. T. Pavlíček; HNHM/14399 2 ex., Mount Meron, under oak, 33°00'33"N 35°23'42"E, 06.02.2002., leg. T. Pavlíček; HNHM/14403 1 ex., Mount Carmel, near of Ornit Cave, 32°45'34"N 34°59'50"E, 02.02.2002., leg. T. Pavlíček; HNHM/14408 1 ex., Mount Carmel, Nahal Ezov, 09.02.2002., leg. T. Pavlíček; HNHM/14411 2 ex., Mount Carmel, Nahal Ezov, Maqui slope, 09.02.2002., leg. T. Pavlíček; HNHM/14415 4 ex., Golan Heights, Rabana, 33°00'35"N 35°23' 42"E, 15.02.2002., leg. T. Pavlíček; HNHM/ 14420 9 ex., HNHM/14425 2 ex Golan Heights, Rabana, sinkhole, 33°12'04"N 35°44'01"E, 15. 02.2002., leg. T. Pavlíček; HNHM/14421 2 ex., Golan Heights, Rabana, 33°12'38"N 35°43'50"E, 15.02.2002., leg. T. Pavlíček; HNHM/14423 3 ex., Golan Heights, Rabana, basalt, 33°00'35"N 35°23'42"E, 15.02.2002., leg. T. Pavlíček; HN HM/14429 2 ex., , HNHM/14431 2 ex., Keren Ben Zimra, rendzina, 33°01'37"N 35°28'04"E, 31.12.2001., leg. T. Pavlíček; HNHM/14435 2 ex., Upper Galilee, Rehaniya, 33°01'N 35°29'E, 20.01.2002., leg. T. Pavlíček; HNHM/14441 2 ex., Rehaniya, chalk, 21.02.2002., leg. T. Pavlíček; HNHM/14616 5 ex., Dalton, 13.03. 2002., leg. T. Pavlíček; HNHM/14701 1 ex., Nahal Oren, 04.03.2002., leg. T. Pavlíček; HN HM/14716 5 ex., Rehaniya, limestone, 29.03. 2002., leg. T. Pavlíček; HNHM/14817 2 ex., Basmat Tab'un, 27.04.2004., leg. T. Pavlíček; HN HM/14920 4 ex., Barta'ah, oak maquis, 32°28' 46"N 35°08'00"E, 25.02.2006., leg. T. Pavlíček; HNHM/14984 1 ex., Keren Ben Zimra – Alma, 25.01.2006., leg. T. Pavlíček; HNHM/15109 1 ex., HNHM/15186 1 ex., Ein Zeitim, basalt, 33°00'34"N 35°28'50"E, 12.01.2005., leg. T. Pavlíček; HNHM/15113 2 ex., Keren Ben Zimra – Alma, 01.02.2006., leg. T. Pavlíček; HNHM/ 15119 3 ex., Dalton – Ein Zeitim, basalt, 33°00'41"N 35°28'52"E, 06.02.2006., leg. T. Pavlíček; HNHM/15140 2 ex., Tel Gezer, 31°51'N 34°54'E, 04.01.2003., leg. T. Pavlíček; HNHM/15157 2 ex., Ein Zeitim, 16.02.2005., leg. T. Pavlíček; HNHM/15161 3 ex., Rehaniya, 12.01.2005., leg. T. Pavlíček; HNHM/15163 2 ex., HNHM/15166 1 ex., Golan Heights, Afiq, 28.02.2005., leg. T. Pavlíček; HNHM/15169 3 ex., Mount Carmel, Mucharka, 04.02.2003., leg. T. Pavlíček; HNHM/15210 3 ex., Mi'ilya, 28.02. 2005., leg. T. Pavlíček; HNHM/15211 2 ex., Lower Galilee, near of Kaukab Abu el Hija, 32°45'56"N 35°14'16"E, 18.04.2004., leg. T. Pavlíček; HNHM/15214 4 ex., Lower Galilee, Basmat Tab'un, 18.04.2004., leg. T. Pavlíček; HNHM/15215 4 ex., Nahal Tabor, 32°42'49"N 34°58'22"E, 28.04.2004., leg. T. Pavlíček; HN HM/15222 10 ex., Nahal Tabor, 32°42'24"N 35°33'16"E, 28.02.2004., leg. T. Pavlíček; HN HM/15235 5 ex., Keren Ben Zimra, 08.02.2007., leg. T. Pavlíček; HNHM/15318 1 ex., HN

HM/15319 1 ex., HNHM/15320 1 ex., Golan Heights, Afiq, 14.03.2005., leg. T. Pavlíček; HNHM/15637 4 ex., HNHM/15640 4 ex., Mount Carmel, 18.02.2006., leg. T. Pavlíček; HNHM /15659 4 ex., Kerem Ben Zimra – Alma, chalk soil, 17.03.2007., leg. T. Pavlíček; HNHM/15662 1 ex., Tabgha, basalt, grassy area, 20.02.2007., leg. T. Pavlíček; HNHM/15665 5 ex., Golan Heights, Masade forest, under oaks, 25.04.2007., leg. T. Pavlíček; HNHM/15666 1 ex., HNHM /15667 3 ex., Golan Heights, basalt soil, 24.05.2007., leg. T. Pavlíček; HNHM/16266 8 ex., Rehaniya, chalk, 12.01.2005., leg. T. Pavlíček; HNHM/16270 5 ex., Rehaniya, chalk, 28.12.2005., leg. T. Pavlíček; HNHM/16272 1 ex., Nahal Oren, 27.03.2006., leg. T. Pavlíček; HNHM/16275 2 ex., HNHM/16278 1 ex., Rehaniya, basalt, 11.01.2005., leg. T. Pavlíček; HNHM/16365 1 ex., HNHM/16493 1 ex., Rehaniya, basalt soil, 12.01.2005., leg. T. Pavlíček; HNHM/16698 5 ex., HNHM/16703 2 ex., HN HM/16706 3 ex., HNHM/16707 3 ex., Golan Heights, 714 m, 32°59'N 35°48'E, 26.03.2009., leg. T. Pavlíček.

Eiseniella neapolitana Örley, 1885

Allurus neapolitanus Örley, 1885: 12.
Allurus ninnii: Rosa 1893: 11.
Allolobophora (Eiseniella) tetraedra var. *sewelli*: Stephenson 1924: 363.
Eiseniella tetraedra ninnii: Bodenheimer 1937: 393, Černosvitov 1938: 549.
Eiseniella tetraedra forma?: Černosvitov 1940: 440.
Eiseniella tetraedra neapolitana: Pavlíček *et al.* 2003: 456.
Eiseniella neapolitana: Csuzdi & Pavlíček 2005: 91.

Material examined. HNHM/14877 4 ex., Golan Heights, Nahal Neshet, 25.05.2002., leg. T. Pavlíček; HNHM/15199 2 ex., Golan Heights, upper part of Nahal Yehudia, 32°50'03"N 35° 48'03"E, 23.06.2002., leg. T. Pavlíček.

Eiseniella tetraedra (Savigny, 1826)

Enterion tetraedrum Savigny, 1826: 184.
Allurus tetraedrus: Rosa 1893: 10.
Eiseniella tetraedra: Bodenheimer 1935: 393, 1937: 259., Csuzdi & Pavlíček 2005: 91.
Eiseniella tetraedra tetraedra: Pavlíček *et al.* 2003: 457.

Material examined. HNHM/15160 2 ex., Ein Zeitim, 13.02.2005., leg. T. Pavlíček; HNHM/ 15194 2 ex., Al-Kelt, 30.03.2005., leg. T. Pavlíček; HNHM/16356 5 ex., Wadi Kelt, near of the spring, 31°50'30"N 35°21'39"E, leg. T. Pavlíček, P. Cardet.

Healyella jordanis (Csuzdi & Pavlíček 1999)

Bimastos jordanis Csuzdi & Pavlíček, 1999: 471., 2002: 109., Pavlíček *et al.* 2003: 456.
Healyella jordanis: Pavlíček *et al.* 2010: 1999.

Material examined. HNHM/14402 2 ex., HNHM/14427 1 ex., Rehaniya, 20.01.2002., leg. T. Pavlíček; HNHM/14428 2 ex., HNHM/14430 1 ex., HNHM/14432 2 ex., HNHM/14439 1 ex., Keren Ben Zimra, rendzina, 33°01'37"N 35° 28'04"E, 31.12.2001., leg. T. Pavlíček; HNHM/ 14433 1 ex., Upper Galilee, Rehaniya, 33°01'N 35°29'E, 20.01.2002., leg. T. Pavlíček; HN HM/14615 1 ex., HNHM/14619 1 ex., HNHM/ 14620 3 ex., Dalton, 13.03.2002., leg. T. Pavlíček; HNHM/14983 2 ex., HNHM/14985 3 ex., HNHM /15111 6 ex., HNHM/15114 1 ex., Keren Ben Zimra – Alma, 25.01.2006., leg. T. Pavlíček; HNHM/15116 2 ex., Keren Ben Zimra – Alma, 01.02.2006., leg. T. Pavlíček; HNHM/15234 5 ex., HNHM/15236 3 ex., Keren Ben Zimra, 08.02.2007., leg. T. Pavlíček; HNHM/16369 1 ex., Rehaniya, basalt, 21.01.2005., leg. T. Pavlíček.

Healyella syriaca (Rosa, 1893)

Allolobophora syriaca Rosa, 1893: 461.
Eophila atheca: Černosvitov 1940: 441.
Dendrobaena atheca typica: Omodeo 1956: 332.
Bimastos syriacus: Csuzdi & Pavlíček 1999: 471., 2002: 109., Pavlíček *et al.* 2003: 456.
Healyella syriaca: Omodeo & Rota 1989: 173.

Material examined. HNHM/14405 1 ex., Mount Carmel, 33°03'18"N 35°28'08"E, 02.02. 2002., leg. T. Pavlíček; HNHM/14406 1 ex., Mount Carmel, Nahal Ezov, 09.02.2002., leg. T. Pavlíček; HNHM/14409 2 ex., Mount Carmel,

Nahal Ezov, Maqui slope, 09.02.2002., leg. T. Pavlíček; HNHM/14436 1 ex., Mount Carmel, Ein Kedem, 25.01.2002., leg. T. Pavlíček; HN HM/14699 1 ex., Nahal Oren, 04.03.2002., leg. T. Pavlíček; HNHM/14713 3 ex., Nahal Tabor, Jordan Valley, E side of road No. 90, 32°54'56"N 35°07'30"E, 21.02.2004., leg. T. Pavlíček; HN HM/14714 1 ex., Nahal Tabor, Jordan Valley, N side of road No. 90, 32°54'56"N 35°07'30"E, 21.02.2004., leg. T. Pavlíček; HNHM/14723 1 ex., Allone Abba, 32°44'08"N 35°20'30"E, 27. 03.2004., leg. T. Pavlíček; HNHM/14873 1 ex., Lower Galilee, Hannaton, park forest, 32°49' 25"N 35°46'21"E, 2003., leg. T. Pavlíček; HN HM/14916 4 ex., HNHM/14922 4 ex., HNHM /14923 1 ex., Barta'ah, oak maquis, 32°28'46"N 35°08'00"E, 25.02.2006., leg. T. Pavlíček; HN HM/15141 6 ex., W bank near Jordan Valley, small wadi, 32°19'40"N 35°30'50"E, 11.02. 2006., leg. T. Pavlíček; HNHM/15152 1 ex., North Negev, 27 km N of Beer Sheva, 31°28'34"N 34°47'55"E, 31.01.2003., leg. T. Pavlíček; HNHM/15196 3 ex., Tel Gezer, 31° 51'N 34°54'E, 04.01.2003., leg. T. Pavlíček; HNHM/15205; HNHM/15634 1 ex., HNHM/ 15638 2 ex., Mount Carmel, 18.02.2006., leg. T. Pavlíček; HNHM/15642 2 ex., Mount Carmel, near of a brook, 18.02.2006., leg. T. Pavlíček; HNHM/15664 1 ex., Kerem Ben Zimra – Alma, chalk soil, 17.03.2007., leg. T. Pavlíček; HNHM/ 16273 1 ex., Nahal Tabor in Jordan Valley, W side of the road No. 90, 21.02.2004., leg. T. Pavlíček; HNHM/16276 1 ex., Muhraqa, Mount Carmel, 22.11.2003., leg. T. Pavlíček; HNHM/ 16696 2 ex., HNHM/16697 1 ex., HNHM/16701 1 ex., HNHM/16705 1 ex., Golan Heights, 714 m, 32°59'N 35°48'E, 26.03.2009., leg. T. Pavlíček.

Helodrilus patriarchalis (Rosa, 1893)

Allolobophora patriarchalis Rosa, 1893: 9., Bodenheimer 1935: 393.
Helodrilus patriarchalis: Bodenheimer 1937: 259., Pavlíček *et al.* 2003: 457., Csuzdi & Pavlíček 2005: 92.

Material examined. HNHM/15189 4 ex., Al-Kelt, 30.03.2005., leg. T. Pavlíček; HNHM/15197 3 ex., Golan Heights, Wadi Meizar, upper part, 06.07.2002., leg. T. Pavlíček; HNHM/15668 5 ex., Wadi Kelt, 30.04.2009, leg. T. Pavlíček.

Murchieona minuscula (Rosa, 1905)

Allolobophora minuscula Rosa, 1905: 38.
Murchieona minuscula: Csuzdi & Pavlíček 2002: 108., Pavlíček *et al.* 2003: 457.

Material examined. HNHM/14921 1 ex., Barta'ah, oak maquis, 32°28'46"N 35°08'00"E, 25.02.2006., leg. T. Pavlíček.

Remarks. After the first record of this Adriatic-Mediterranean species in Nahal Keziv and Nahal Oren, Israel, this is the third occurrence which means that the species as hypothesized by Csuzdi & Pavlíček (2002) is more widely distributed in Israel, but easy to overlook due to its small size.

Perelia galileana Csuzdi & Pavlíček, 2005

Perelia galileana Csuzdi & Pavlíček, 2005: 81.

Material examined. HNHM/14698 1 ex., Nahal Oren, 04.03.2002., leg. T. Pavlíček; HN HM/14917 3 ex., HNHM/14918 6 ex., Barta'ah, oak maquis, 32°28'46"N 35°08'00"E, 25.02. 2006., leg. T. Pavlíček; HNHM/15223 2 ex., Nahal Oren, 15.04.2002., leg. T. Pavlíček; HN HM/15639 1 ex., Mount Carmel, 18.02.2006., leg. T. Pavlíček.

Perelia shamsi Csuzdi & Pavlíček, 2005

Perelia shamsi Csuzdi & Pavlíček, 2005: 84.

Material examined. HNHM/15146 2 ex., Tel Keshet, 08.01.2003., leg. T. Pavlíček; HNHM/ 15148 3 ex., North Negev, W of Beer Sheva, 31°29'11"N 34°47'50"E, 31.01.2003., leg. T. Pavlíček; HNHM/15154 4 ex., North Negev, 27 km N of Beer Sheva, 31°28'34"N 34°47'55"E, 31.01.2003., leg. T. Pavlíček.

Remarks. This is the first record of *P. shamsi* after the original description.

DISCUSSION

During sporadic surveys carried out in the 2000s in different parts of Israel altogether 20 earthworm species were collected including *Bimastos parvus*, a North American peregrine species which represents a new record for the fauna of Israel. Three other species; *Dendrobaena nevoi*, the Northern Negev species *Perelia shamsi*, and *Healyella jordanis* were firstly recorded after their original descriptions, the first two of some 20 km, the third one *ca.* 60 km distance from the type locality. This indicates that all the three Israeli endemic species might have a larger distribution area.

Together with the newly listed *B. parvus* the current number of the lumbricid species recorded for Israel is 28. Comparing this number with those recorded for the more than four times larger Hungary (59 species, Csuzdi & Zicsi 2003) indicates a quite well explored earthworm fauna, however finding more new records or species cannot be excluded especially the in the Northernmost region of the country.

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